Other Safety and Health Abstracts[1]

A Conceptual Model of Overexertion, Safety, and Risk of Injury in Occupational Settings (S. Kumar) (1994. *Human Factors* 36(2):197-209)

A conceptual generic model for fatigue-mediated overexertion, margin of safety, and job-related risk of injury is proposed. The model has been built with the variables of force, effective exposure in time domain, and motion of the exertion in space. With the proposed model, the physical risk factors can be identified and quantified. It also allows one to gauge a relative contribution of various integral factors involved in fatigue-mediated occupational injuries. Although the model is based on established relationships between the job variables (strength [force], frequency-duration of exposure, recovery from exposure, and range of required motion) and the injuries sustained, it has not been validated within any single study. The model provides a framework for numerous validation studies. With availability of more information through such studies, the model can be appropriately refined for accuracy of its prediction.

A Study of Five Years of Tractor-related Fatalities in Iowa (C. J. Lehotola, S. J. Marley, S. W. Melvin) (1994. *Applied Engineering in Agriculture* 10(5):627-632)

Agricultural tractor-related fatalities in Iowa for the five years 1988 through 1992 were analyzed. One hundred thirty-six fatalities from 131 fatal incidents reported in Iowa's newspapers were used as the data source. There were no deaths in overturns involving tractors equipped with a rollover protective structure (ROPS). Based on years of productive life lost, it is estimated that tractor fatalities cost Iowa a minimum of $7.25 million per year.

An Agricultural Safety and Health Information Needs Assessment for Rural Service Providers (I. A. Greaves, D. K. Olson, J. Shutske, L. Kochevar) (1994. *Journal of Agromedicine* 1(3):43-58)

The purpose of this survey was to identify the educational needs of service providers for information on the prevention and control of agricultural injury and illness. A random sample of 28% from each of the state provider groups was chosen. These groups included veterinarians, chiropractors, extension agents, farm implement dealers and physicians. An exception to this strategy was public health nursing directors, where all were chosen due to the small sample size. Provider groups were identified from state licensure and association lists excluding zip codes of 554 and 551 (metropolitan area). Of the 593 valid questionnaires returned (59% overall response rate) the average age of the respondents was 45 years; males accounted for 77%; average length of professional practice was 18 years; and 39% of respondents had farmed at least some time in their lives. The respondents overall showed greatest interest in receiving information on lung and breathing problems, farm machinery injury, safe handling of agrichemicals and poisoning. The most valuable information in the past two years has been received from the Cooperative Extension Service, professional magazines and educational conferences. In general, respondents reported a greater level of interest in future sources of information that may be viewed as specific to the need of the provider group and in a permanent form that they could keep or refer back to if the need arose (e.g., newsletters, films/videotapes and magazines) or in

1. This document was extracted from the Journal of Ag Safety and Health (Volume 1, Number 1, February 1995).

sources that involved direct contact with people regarded as experts in the field (e.g. Cooperative Extension Service and health care professionals).

Dust- and Endotoxin-related Acute Lung Function Changes and Work-related Symptoms in Workers in the Animal Feed Industry (T. Smid, D. Heederik, R. Houba) (1994. *American Journal of Industrial Medicine* 25(6):877-888)

Reported respiratory and related symptoms during work were compared between 265 exposed animal feed workers and a control group consisting of 175 external controls and nonexposed workers in the animal feed industry. Symptoms indicating respiratory and nasal irrigation were significantly increased in the animal feed workers. Prevalences ranged from 9% (cough) to 21% (sneezing). Reported cough after work was also significantly increased. In 119 workers, a total of 457 across-shift spirometric lung function changes were measured. Almost all lung function variables showed a decrease during the work shift, as could be expected since the circadian rhythm is in a downward phase during the measurement period (2 p.m.-10 p.m.). When the workers were grouped into dust and endotoxin exposure categories according to their job titles, and exposure-response trend was seen for maximum mid-expiratory flow (MMEF) and maximum expiratory flow rate at 50% of vital capacity (MEF50). The effect of endotoxin was stronger than that of dust, both in magnitude and significance. For the same lung function variables and for forced expiratory volume in 1 second (FEV1) and MEF25, a significant across-week change was also detected. The results of this study are in concordance with other studies that indicate acute effects on lung function and elevated prevelances of respiratory symptoms during work caused by exposure to grain dust.

Farm Stressors: The Hazards of Agrarian Life (P. D. Elkind, H. Cody-Salter) (1994. *Annals of Agricultural and Environmental Medicine* 1(1):23-27)

Farming continues to be a hazardous activity despite efforts to educate farmers on health and safety methods. The literature indicates some of these hazardous activities may be related to the stress farmers experience which in turn influences decision-making processes regarding health and safety measures. Farmers not only undergo stress common to any occupation, but they also experience a range of stressors specifically related to farming. This paper compares research on significant stressors in farmers' lives in the midwestern United States and Canada to stressors reported by farmers in eastern Washington state within the United States of America.

Feasibility Study of Inspection of Farm Machinery Safety Features (M. A. Purschwitz, D. T. Stueland, B. C. Lee) (1994. *Journal of Agromedicine* 1(2):29-38)

Agriculture continues to be a very hazardous industry. One of the possible risk factors for injury may be the absence of safety features on farm machinery. A feasibility study was undertaken to assess the feasibility of obtaining information on deficiencies or absence of safety devices. Tractors and power take-off (PTO) driven machines on 36 dairy farms were inspected. The pilot study was well received by farmers. The absence of rollover protective structures (ROPS) and PTO shields appeared related to the age of the machine. Since the sample was a convenience sample consisting only of diary farms, no substantial inferences from such a pilot study should be drawn. It did appear, however, that such a project was readily accepted, and that older machinery more often possessed deficient or missing safety devices.

Influence of Warning Label Signal Words on Perceived Hazard Level (M. S. Wogalter, S. W. Jarrard, S. N. Simpson) (1994. *Human Factors* 36(3):547-556)

This experiment investigated the influence of warnings, signal words, and a signal icon on perceived hazard of consumer products. Under the guise of a marketing research study, 135 people (high school students, college students, and participants from a shopping mall) rated product labels on six dimensions, including how hazardous they perceived the products to be. A total of 16 labels from actual household products were used: 9carried the experimental conditions, and 7 were filler product labels that never carried a warning. Five conditions presented the signal words NOTE, CAUTION, WARNING, DANGER, and LETHAL together with a brief warning message. In another two conditions, a signal icon (exclamation point surrounded by a triangle) was presented together with the terms DANGER and

LETHAL. In the final two conditions, one lacked a signal word but retained the warning message, and the other lacked both the warning message and the signal word. Results showed that the presence of a signal word increased perceived product hazard compared with its absence. Significant differences were noted between extreme terms (e.g., NOTE and DANGER) but not between terms usually recommended in warning design guidelines (e.g., CAUTION and WARNING). The signal icon showed no significant effect on hazard perception. Implications of the results and the value of the methodology for future warnings investigations are discussed.

Intervention Research in Occupational Health and Safety (L. M. Goldenhar, P. A. Schulte) (1994. *Journal of Occupational Medicine* 36(7):763-775)

This paper reviews occupational health and safety intervention studies published between 1988 and 1993 to gauge the nature and extent of research in this area. Generally, the studies often lacked a theoretical basis, used small samples, and tested interventions lacking the intensity to cause the desired change. Most designs were either nonexperimental or quasi-experimental with uncontrolled sources of bias. Recommendations for future research include methods of minimizing the problems and biases caused by these weaknesses. Nonmethodological issues such as the costs of implementing interventions and the cultural and political dimensions of the workplace are also addressed. Although many methodological issues associated with field-based research are not easily addressed, researchers should make a stronger attempt to address these issues if the field of occupational health and safety intervention research is to be productive.

Logging Fatalities in the United States by Region, Cause of Death, and Other Factors—1980 through 1988 (J. R. Myer , D. E. Fosbroke) (1994. *Journal of Safety Research* 25(2):97-105)

Logging has been reported to be one of the most hazardous industries in the United States for fatal injury. However, most studies have been at the state level and did not look at the logging industry specifically, but identified the risk of this industry through comparisons of fatalities across all industries. National data on logging injuries have concentrated on nonfatal injuries, not fatal injuries. To learn more about fatal logging injuries, the National Institute for Occupational Safety and Health analyzed the National Traumatic Occupational Fatality surveillance system for demographic differences in logging fatalities occurring in the United States from 1980 through 1988. The results indicate that there are regional differences in logging fatality rates, with the highest fatality rates occurring in those regions of the country harvesting primarily hardwood sawtimber. No significant differences in fatality rates between African-American and white workers were found.

Rural Assistive Technology Hypermedia Decision Support System (S. A. Freeman, D. D. Jones, W. E. Field) (1994. *Applied Engineering in Agriculture* 10(6):823-830)

A prototype hypermedia decision support system for the selection and documentation of rural assistive technology (BNG DATA) was developed to aid professionals working with farmers, ranchers, and agricultural workers with physical disabilities. The hypermedia system (constructed using HyperCard, an environment that combines hypertext and database features) consists of a hypermedia database of rural assistive technology examples and an accompanying decision support system that helps users identify solution alternatives to meet the needs of their clientele. End user acceptance of BNG DATA was determined using an evaluation questionnaire. The end users evaluating the prototype considered BNG DATA to be easy to learn, easy to use, and unanimously considered BANGDATA to be a valuable resource that they would like to have for their own use. Using a statistical experiment in conjunction with the questionnaire, it was also concluded that BNGDATA significantly reduced the amount of time required by end users to find acceptable solution alternatives for their clientele ($a = 0.01$) and increased the end users' confidence in the solutions they obtained ($a = 0.10$). This article describes the development and testing of BNG DATA, focusing on the steps taken ensure end user acceptance.

The Agrarian Myth and Policy Responses to Farm Safety (T. W. Kelsey) (1994. *American Journal of Public Health* 84(7):1171-1177)

Agriculture's status as one of the nation's most hazardous occupations has been an impetus for a reexamination of the federal role in agricultural safety and for various proposals to make farming safer. During the 1970s congressional debate and farm group testimony that led to agriculture's current exemption from the Occupational Safety and Health Administration's enforcement efforts, regulation foes made use of the “Agrarian Myth.” The myth portrays farmers as the bedrock of democracy, suffering so that society may prosper and living a natural life away from the artificiality and evils of cities. Despite the inaccuracy of its images, the myth is a potent symbol in American culture, and its influence could arise again in current policy debates. This paper examines specific issues that may be obscured by the myth but that must be addressed in any agricultural safety policy debate. It then recommends that responses to agricultural safety be carefully considered and that value judgments about what the issues are, who would benefit, and who would bear the costs be explicitly discussed during debate.

The Lateral Stability and Dynamic Behaviour of Tractor Front Linkages (P. A. Cowell, A. Sarfert, J. R. Austen) (1994. *Journal of Agricultural Engineering Research* 58(3):145-157)

Tractor front linkages which have lateral freedom of movement are often unstable when used with ground engaging implements. If the linkage is made rigid steering becomes difficult. Front linkage-implement combinations are shown to be stable only if the linkage is forward converging and the ratio of the directional force constant (the side force exerted by the soil per unit of slip angle of the implement) to the draught force exceeds a critical value determined by the linkage-implement geometry.